

Date: Tuesday, 4/17/2007 11:03:38 AM
 User: Kim Johnston

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : SA 315B LAMA SKID ASSY
 Job Number : 31823
 Estimate Number : 12827
 P.O. Number :
 This Issue : 4/17/2007 S.O. No. :
 Prsht Rev. : NC Part Number : D315668011
 First Issue : / / Type : LANDING GEAR Drawing Number : D2904 REV **KB**
 Previous Run : 31822 Drawing Revision : **KB** *OK 4/20/07*
 Written By :
 Checked & Approved By : *4/20/07*
 Comment : Est Rev: A New Issue 07-04-12 JLM Material :
 Due Date : 5/30/2007 Qty: 1 Um: Each

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Photocopy bluefile & type labels per PPPD315-668-011 CHG 001

07.05/10

2.0 D2904B 315 Skidtube Ext. (Bent)



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

315 Skidtube Ext. (Bent)

Batch: *B31826**DP 7-10-22*

3.0 D2910 Doubler (Lama skid)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Doubler (Lama skid)

BATCH: *B31827**DP 7-10-22*

4.0 D2911 Doubler (Lama Skid)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Doubler (Lama Skid)

BATCH: *B31828**DP 7-10-22*

5.0 D2912 Doubler (Lama Skid)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Doubler (Lama Skid)

BATCH: *B31829**DP 7-10-22*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Tuesday, 4/17/2007 11:03:39 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31823

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description:

6.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill aft cap hole as per Dwg D2904 using DT8025.

2-Drill saddle holes (6 Deg) as per Dwg D2904 & DT8938A.
(ENSURE THAT LOCATOR RING IS SET FOR LH TUBE

3-Drill Ghw Holes (3 Deg) as per Dwg D2904 using DT8938B
(ENSURE THAT LOCATOR RING IS SET FOR LH TUBE)

4-Insert doublers using DT8938C (Boone Apparatus)

5-Cleco Doublers and DT8938D in position .Transfer all 256 holes thru tube and Doublers.

6-Remove and Deburr doublers and Attach to work order.

7-C'sink Rivet holes 256 places as per Dwg D2904.

8-Deburr if nessary.

Handwritten: 7-10-22

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

Handwritten: 09/10/22

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat *****Tube & Doublers *****as per QSI 005 4.1

Handwritten: DP 7-10-22

9.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

Handwritten: 09/10/23

10.0

MS20601AD4W3

Rivet



Comment: Qty.: 256.0000 Each(s)/Unit Total : 256.0000 Each(s)

Rivet

BATCH: M104374 260

Handwritten: DP 7-10-26

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31823

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description:

11.0

D2905

Web (Lama)



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Web (Lama)

Batch:

B-31065 AWM 07-10-23

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Rivet Doublers as per Dwg D2904.

2-Open X-Bolt Spacer as per Dwg D2904
(Do not use Cutting oil)

3-C/Sink X-bolt spacer holes to prepare for Welding.

4-Remove indexing ridge from aft end of tube.

5-Blow all chips from inside tube.

6-Bond web in place per QSI 015. Allow 12 Hrs. cure time before cutting

Pick:

Qty Part Number Description Batch

A/R Sikaflex-291

M105448

Sikaflex expire date: *08-07-01*

Start Time: *2:15*

Date:

07-10-23

Fin Time: *10:00*

Date:

07-10-24

- AWM / DP 07-10-23

13.0

D2909

Spacer (Lama)



Comment: Qty.: 11.0000 Each(s)/Unit Total: 11.0000 Each(s)

Spacer (Lama)

Batch:

B14091 BE 07-10-24

14.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Weld crossbolt spacers D2909as per Dwg. D2904and QSI 004.

For D2579 spacers, weld one side, pass Y" drill, weld other side, pass Y" drill

A/R

Aluminum Rod

M105138 BE 07-10-24

4-Grind welds as per Dwg D2909 Grind

DP 7-10-26

W/O:		WORK ORDER CHANGES					
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Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31823

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description :

5-Drill holes for wearplates using DT8217 Open holes to 19/64", adjust stopper not to hit web. Deburr

6-Cut Tube as per Dwg D2904.

7-Remove Indexing Ridge on Fwd End of tube as per Dwg D2904.

8-Drill Fwd Cap holes as per Dwg D2904 Using Dt 8025.

9-Deburr.

DP
7-10-26

15.0

QC5

INSPECT WORK TO CURRENT STEP



QC5 07/10/25



Comment: INSPECT WORK TO CURRENT STEP QC9 → PD 07-10-29

16.0

POWDER COATING

POWDER COATING



Pressure wash 07/11/06
M-105194



Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

07-11-07 (1)

17.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Wing Walk as per Dwg D2904 and QSI 005 4.4

Batch:

1/4 Due at step 28.5

18.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

BR 07-11-09

19.0

D2646

Aft Cap



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Aft Cap

Batch:

B31335

20.0

D26483

Wearpad



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)

Wearpad

Batch:

B33059

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31823

Part Number: D315668011

Job Number:



Seq. #:	Machine Or Operation:	Description :
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21.0	D26483	Wearpad
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~~REF DSI 9172~~

REF DSI 9172, D2648-5



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) REPLACED BY D2648-3

Wearpad

Batch: B33039

9/27/04.17

22.0	D265613	Wearplate
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Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Wearplate

Batch: B33419

23.0	D265633	Wearplate
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Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Wearplate

Batch: B34884

24.0	D2907	Wearshoe (Lama)
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Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Wearshoe (Lama)

Batch: B14654

25.0	ALS41032130	Insert
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Comment: Qty.: 50.0000 Each(s)/Unit Total : 50.0000 Each(s)

Insert

Batch: M105729

26.0	AN960JD10L	Washer
------	------------	--------



Comment: Qty.: 54.0000 Each(s)/Unit Total : 54.0000 Each(s)

Washer

Batch: M104374

27.0	MS27039108	Screw
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Comment: Qty.: 54.0000 Each(s)/Unit Total : 54.0000 Each(s)

Screw

M104547

BR 07-11-15

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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Drawing Name: SA 315B LAMA SKID ASSY

Job Number: 31823

Part Number: D315668011

Job Number:



Seq. #:

Machine Or Operation:

Description :

28.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

1-Install inserts & wearplates as per Dwg. D2904. Use a drop of Sikaflex on insert holes before installing wearplates

A/R Sikaflex-291

Sikaflex expire date:

M105585
08-07

3-Inspect for foreign object per QSI 024

4-Install 2646 Aft & fwd Caps as per Dwg D2904 and seal with Sikaflex. Clean excess adhesive

A/R Sikaflex-291

Sikaflex expire date:

M105585
08-07

5-Wing Walk as per Dwg D2904 and QSI 005 4.4

M106030

Batch:

FX 07/11/12

29.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

30.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D315668-011

Location:

PPP Rev:

A

6 7/14/13

31.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



W 07.11.14

31823

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART

DESIGN <i>[Signature]</i>	DRAWN BY <i>RF</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. DSI 9172	REV. A SHEET 1 OF 1
DATE 99.11.02		TITLE WEARPAD KITS	SCALE NTS
A	99.11.02	NEW ISSUE	

DART SERVICE INSTRUCTION

TO AMEND INSTALLATION INSTRUCTIONS: D206-642

IIN-D350-636

IIN-D058-672

IIN-D315-668

Qty -105	Qty -205	Qty -107	Qty -207	Part Number	Description
X				DSI 9172-105	SURFACITE™ WEARPAD KIT
	X			DSI 9172-205	STD. TUNGSTEN CARBIDE WEARPAD KIT
		X		DSI 9172-107	SURFACITE™ WEARPAD KIT
			X	DSI 9172-207	STD. TUNGSTEN CARBIDE WEARPAD KIT
	5		7	D2648-3	WEARPAD
5		7		D2648-7	WEARPAD
20	20	28	28	MS27039-1-08	SCREWS
20	20	28	28	AN960JD10L	WASHERS

NOTES:

- 1) D2648-5 CAN BE REPLACED BY D2648-3.
- 2) IN THE DSI 9172 -105/ -107 KTS, THE D2648-7 WEARPADS REPLACE THE D2648-3 AND D2648-5 WEARPADS SHOWN IN THE INSTALLATION INSTRUCTIONS.
- 3) THE ABOVE KITS CAN BE INSTALLED ON DART 206 A/B, 206L/L1/L3/L4, 407, OH-58 A/A+/C, AS 350/355, AND SA 315B SKIDTUBES ACCORDING TO THE FOLLOWING TABLE:

KIT	CAN BE INSTALLED ON
DSI 9172-105 DSI 9172-205	D206-642-111/ -112 D206-642-211/ -212/ -213/ -214 D350-636-011/ -012/ -013/ -014 D315-668-011/ -012 D058-672-011/ -012/ -013/ -014
DSI 9172-107 DSI 9172-207	D206-642-311/ -312 D206-642-411/ -412

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WORK ORDER
NO. **31823**

- 4) INSTALLATION OF THE DSI 9172 -105 KIT WILL ADD 0.95 lbs (0.43 kg) TO THE WEIGHT OF THE SKIDTUBE.
- 5) INSTALLATION OF THE DSI 9172 -107 KIT WILL ADD 1.33 lbs (0.60 kg) TO THE WEIGHT OF THE SKIDTUBE.



DESIGN CP	DRAWN BY CP	DART AEROSPACE USA, INC. BELLEVUE, WA	
CHECKED [Signature]	APPROVED [Signature]	DRAWING NO. D2904	Rev. B SHEET 1 OF 3
DATE 00.06.21		TITLE SA 315B SKIDTUBE ASSEMBLY SCALE NTS	
A	99.09.09	NEW ISSUE	
B	00.06.21	CHANGED ANGLES FOR HOLES	

PARTS LIST:

Qty -041	Qty -042	Part Number	Description
X		D2904-041	LH SKIDTUBE ASSEMBLY
	X	D2904-042	RH SKIDTUBE ASSEMBLY
2	2	D2646	CAP
4	4	D2648-3	WEARPAD
1	1	D2648-5	WEARPAD
1	1	D2656-13	WEARSHOE
1	1	D2656-33	WEARSHOE
1		D2904-1	SKIDTUBE
	1	D2904-2	SKIDTUBE
1	1	D2905	WEB
1	1	D2907	WEARSHOE
11	11	D2909	CROSS BOLT SPACER
2	2	D2910	SKIDTUBE DOUBLER
2	2	D2911	SKIDTUBE DOUBLER
2	2	D2912	SKIDTUBE DOUBLER
50	50	ALS7-1032-130 or AKS4-1032-130 or ALS4-1032-130 or ALS7-1032-130	INSERT
54	54	AN960JD10L	WASHER
256	256	MS20601AD4W3	RIVET
54	54	MS27039-1-08	SCREW

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00.09.01 #

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DART

DESIGN <i>CP</i>	DRAWN BY <i>CP</i>	DART AEROSPACE USA, INC. BELLEVUE, WA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D2904	Rev. B SHEET 2 OF 3
DATE 00.06.21		TITLE SA 315B SKIDTUBE ASSEMBLY	SCALE 1:20

GENERAL NOTES:

1. TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
2. MAKE D2904-1 AND D2904-2 FROM D2914 EXTRUSION (INITIAL LENGTH = 142.0).
3. DAMAGE TOLERANCE ON BENDING:
THERE SHOULD BE NO VISIBLE WRINKLES IN THE BEND FROM THE GROUND TO A HEIGHT OF 7 INCHES ABOVE THE GROUND. NO GOUGING IS ACCEPTABLE IN THE FLAT PORTION OF THE TUBE. GOUGES UP TO 0.020 ARE ACCEPTABLE IN THE BENT PORTION OF THE TUBE. TUBE O.D. SHOULD BE 3.150 ± 0.010 IN THE FLAT PORTION OF THE TUBE. A MAXIMUM REDUCTION IN DIAMETER OF 0.150" IS ACCEPTABLE IN THE BENT PORTION OF THE TUBE.
4. ALL HOLES DRILLED ON CENTERLINES EXCEPT THOSE NOTED BY SECTION C-C.
5. DRILL #30 HOLES ($\varnothing 0.128$ REF) TO LINE UP WITH $\varnothing 0.128$ HOLES IN D2910/D2911/D2912 DOUBLERS. C'SINK $\varnothing 0.239 \times 100^\circ$.
6. BOND D2905 WEB INTO D2904-1 (OR D2904-2) OUTER TUBE WITH NON-STRUCTURAL SIKAFLEX-241/291 ADHESIVE PER DART QSI 015. ENSURE HOLES LINE-UP.
7. WELDING TO BE DONE PER DART QSI 004.
8. AFTER DRILLING, BENDING, AND INSTALLING WEB & DOUBLERS, PERFORM THE FOLLOWING FOR $\varnothing 0.500$ HOLES ONLY:
 - CHAMFER HOLE $0.050 \times 45^\circ$
 - INSERT D2909 SPACER (11 PLACES)
 - WELD INTO PLACE
 - GRIND FLUSH
 - DRILL OUT SPACER TO $\varnothing 0.406$
9. FINAL CONFIGURATION SHOULD HAVE THE FOLLOWING MINIMUM MECHANICAL PROPERTIES:
 - MINIMUM YIELD TENSILE STRENGTH = 35 ksi
 - MINIMUM ULTIMATE TENSILE STRENGTH = 38 ksi
10. FINISH:
 - ACID ETCH, ALODINE ASSEMBLY PER DART QSI 005 4.1 PRIOR TO INSTALLING D2905 WEB AND D2910/D2911/D2912 DOUBLERS.
 - POWDER COAT WHITE (REF. 4.3.5.1) PER DART QSI 005 4.3
 - BLACK ANTI-SKID PAINT AS INDICATED TO 1.0 ABOVE SKIDTUBE CENTER-LINE PER DART 005 4.4 (OPTIONAL).
11. DRILL $\varnothing 0.297$ FOR ALS7-1032-130 INSERT USING DT8395 BEFORE FINISH. INSTALL ALS7-1032-130 INSERTS AFTER FINISH.

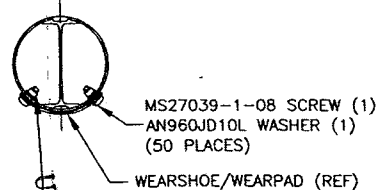
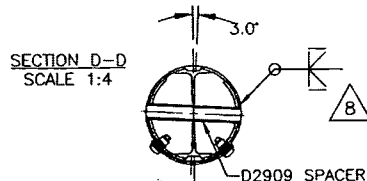
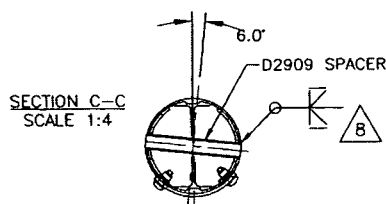
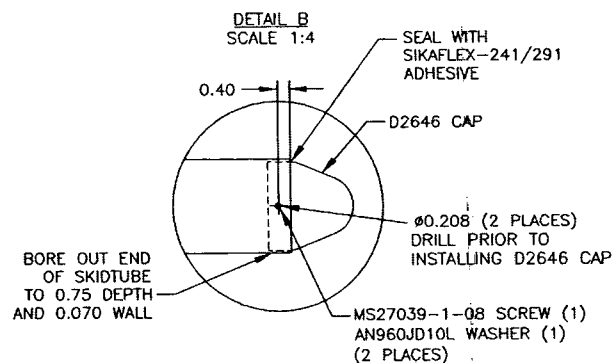
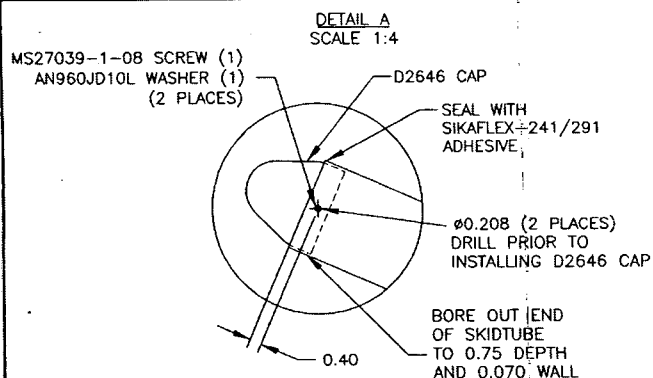
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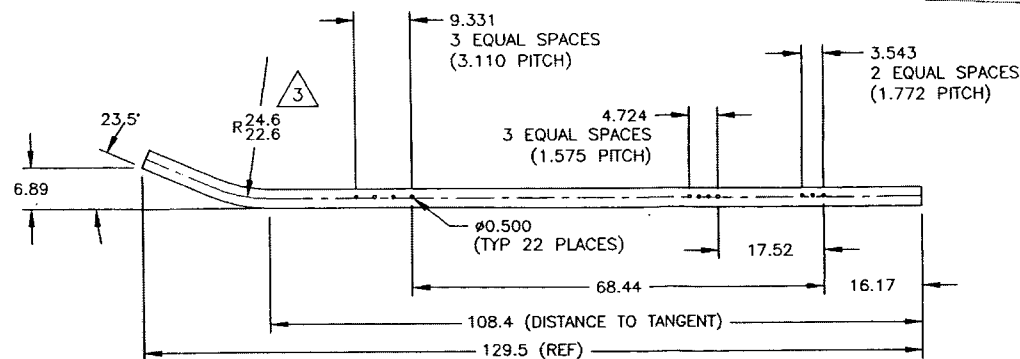
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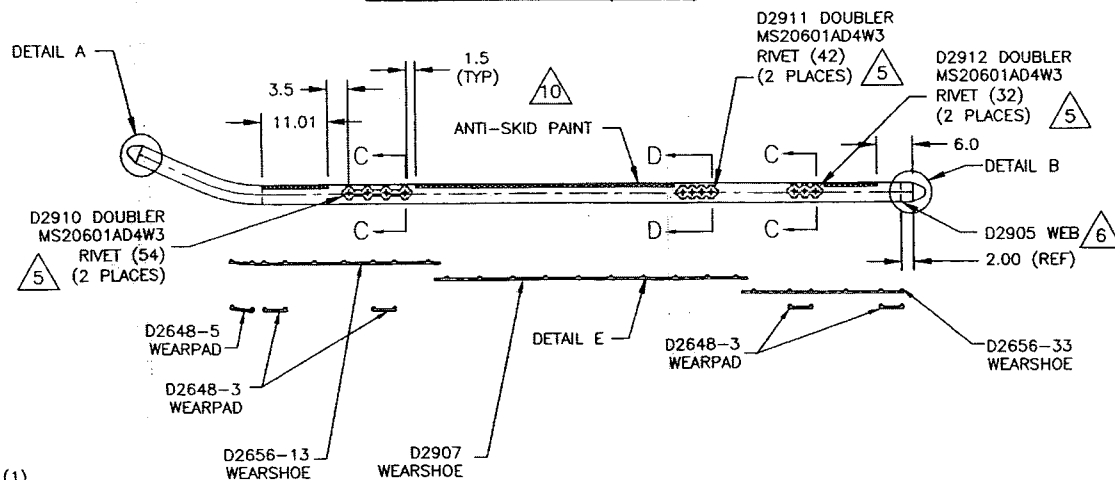
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D2904-1 BENDING/DRILLING DETAIL (SHOWN)
D2904-2 BENDING/DRILLING DETAIL (OPPOSITE)



D2904-041 LH ASSEMBLY DETAIL (SHOWN)
D2904-042 RH ASSEMBLY (OPPOSITE)



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DESIGN CP	DRAWN BY CP	DART DART AEROSPACE USA, INC. BELLINGHAM, WA
CHECKED #	APPROVED #	DRAWING NO. D2904
DATE 00.06.21	TITLE SA 315B SKIDTUBE ASSEMBLY	REV. 8 SHEET 3 OF 3 SCALE 1:20

Peter Hum

From: David Shepherd [dshepherd@dartaero.com]
Sent: May 4, 2007 11:09 AM
To: 'Chris Provencal'
Cc: 'Peter Hum'; 'Jason Murdoch'; 'Eric Charbonneau'; 'Marc Bellavance'
Subject: RE: NCR D2905

These webs are acceptable.
Please ovalize the holes longitudinally at 14.17" to clear the spacers.
Do NOT enlarge the holes to 1.0"

My apologies for taking so long to get back to you.
I didn't realize the urgency and I have a lot going on right now.

David

From: Chris Provencal [mailto:cprovencal@dartaero.com]
Sent: Monday, April 30, 2007 9:05 AM
To: David Shepherd (David Shepherd)
Cc: 'Peter Hum'; 'Jason Murdoch'; Eric Charbonneau
Subject: NCR D2905

David,

The D2905 web for the llama skidtube: the drill jig is not to drawing. The hole grouping @ 14.17" is located at 14.02", the 31.69" is at 31.62". There are several webs (I believe its 6) that are affected by this.

The holes at 31.69" will clear the spacers. The holes at 14.17" will need to be enlarged. A 1" diameter hole will work. Or, if you want to minimize the material removed, they can grind to ovalize the holes (qty 3) on one side only. Ref the attached dwg.

The tool will be placed 'under review', so it can be corrected for the next batch.

Can you cc Jason M, Eric C, and Peter H.

-Chris

No virus found in this incoming message.
Checked by AVG Free Edition.
Version: 7.5.467 / Virus Database: 269.6.1/778 - Release Date: 4/27/2007 1:39 PM

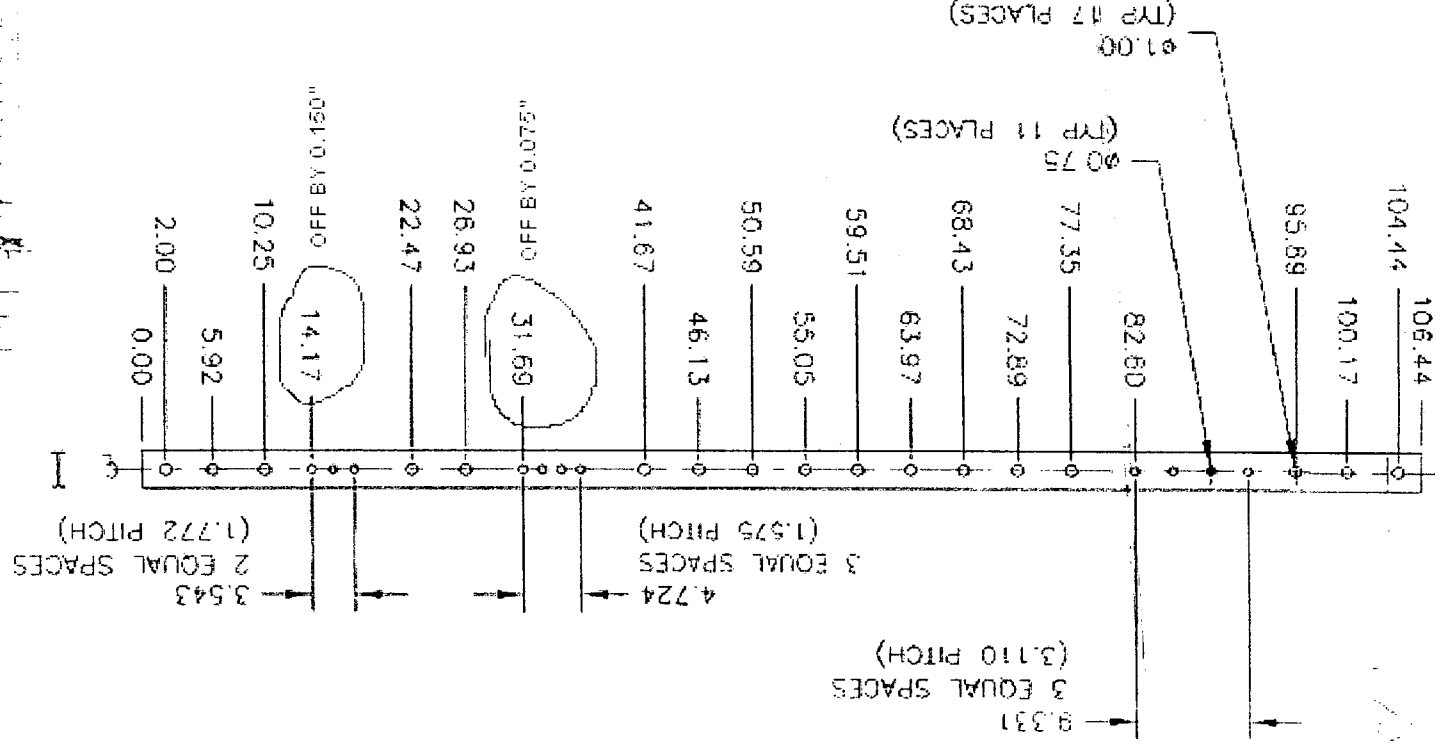
No virus found in this outgoing message.
Checked by AVG Free Edition.
Version: 7.5.467 / Virus Database: 269.6.2/787 - Release Date: 5/3/2007 2:11 PM

04/05/2007

DART



DART AEROSPACE USA, INC. BELLEVUE, WA			
DESIGN 11	DRAWN BY RF	DRAWING NO. D2905	REV. A SHEET 1 OF 1
CHECKED 11	APPROVED 11	TITLE WEB	SCALE 1:15
DATE 41.60.66	99.09.66	NEW ISSUE	
A			



NOTES:
MAKE FROM D2600-5 EXTRUSION
ALL HOLES ON CENTERLINE
FINISH: ACID ETCH AND ALODINE PER DART QSI 005 4.1
TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES

RELEASED
2025-09-22

NO. 130

AWS D17.1.2001
QUALIFICATION TEST RECORD

Name Barclay Elliot
Joint Welding Procedure t.g
Part number and Job number D350 630 01 / B33961

TEST WELDS REQUIRED

BASE METAL Aluminium WELDING PROCESS t.g
Penetration Complete ☐ Partial ☒ Single Weld ☒ Double Weld ☐
Current AC ☒ DC ☐ Backing YES ☐ NO ☒

	Position		Vertical Down <input type="checkbox"/> Up <input type="checkbox"/>	
Sheet Groove	1G <input type="checkbox"/>	2G <input type="checkbox"/>	3G <input type="checkbox"/>	4G <input type="checkbox"/>
Tube Groove	1G <input type="checkbox"/>	2G <input type="checkbox"/>	3G <input checked="" type="checkbox"/>	6G <input type="checkbox"/>
Sheet Fillet	1F <input type="checkbox"/>	2F <input type="checkbox"/>	3F <input type="checkbox"/>	4F <input type="checkbox"/>
Tube Fillet	1F <input type="checkbox"/>	2F <input type="checkbox"/>	4F <input type="checkbox"/>	5F <input type="checkbox"/>

Crossbolt Spacer Welded into Skidtube

TEST RESULTS

Visual Pass ☒ Fail ☐
Penetration Pass ☒ Fail ☐
Crossbolt Spacer Pass ☒ Fail ☐

The above named individual is qualified in accordance with AWS D17.1.2001 to weld

Date of Test Coupon 07-09 Qualifier Pd. Dal